A STUDY OF DIABETIC COMPLICATIONS IN NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS PATIENTS

THESIS FOR

DOCTOR OF MEDICINE

(INTERNAL MEDICINE)

BUNDELKHAND UNIVERSITY
JHANSI (U.P.)

2004 **VAIBHAV SHUKLA**

CERTIFICATE

This is to certify that the work entitled ***" A study of diabetic complications in newly diagnosed Type 2 Diabetes Mellitus patients."*** which is being submitted as a thesis for M.D. (Medicine) Examination 2004 of Bundelkhand University, Jhansi, has been carried out by ***Dr.Vaibhav Shukla*** in the Department of Medicine, M.L.B. Medical College, Jhansi.

The method described was undertaken by the candidate himself and the observations recorded have been periodically checked. He has put in the necessary stay in the Department as per University regulations, and has fulfilled the conditions required for the submission of thesis according to University regulations.

Dated: / /

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CERTIFICATE

This is to certify that the work entitled ***"A study of diabetic complications in newly diagnosed Type 2 Diabetes Mellitus patients."*** " which is being submitted as a thesis for M.D. (Medicine) Examination 2004 of Bundelkhand University, Jhansi, has been carried out by ***Dr.Vaibhav Shukla*** under my direct supervision and guidance. The techniques embodied in the thesis were undertaken by the candidate himself and the observations recorded have been checked and verified by me from time to time.

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CERTIFICATE

This is to certify that the work entitled ***" A study of diabetic complications in newly diagnosed Type 2 Diabetes Mellitus patients."*** which is being submitted as a thesis for M.D. (Medicine) Examination 2004 of Bundelkhand University, Jhansi, has been carried out by ***Dr. Vaibhav Shukla*** under my direct supervision and guidance. The techniques embodied in the thesis were undertaken by the candidate himself and the observations recorded have been checked and verified by me from time to time.

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Vaibhav Shukla

Date / / ***Vaibhav Shukla***

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Introduction

Introduction

Diabetes mellitus is the most prevalent metabolic, non communicable disorder in the world. The increasing prevalence of type 2 diabetes mellitus is a global problem, and it is unfortunately, a major one in developing countries such as India. The world presently has nearly 150 million diabetics of which one fifth that is approximately 33 million are in India. In fact India has been dubbed as the Diabetes Capital of the World at the recent 2003 International Diabetes Federation (IDF) conference in Paris. The WHO has projected that by 2005 A.D there will be a 170% increase in the diabetic population in developing countries like India.[1]

Diabetes mellitus has emerged a major public health problem in our country and has assumed epidemic proportions. Prevalence of Diabetes has increased from 2.1% in 1972 to almost 20% in 2003. The vast majority of these are Type 2 patients.

Consequent to the rising prevalence of diabetes, the number suffering from complications will also increase. In order to have the holistic view of the challenge, it is essential to have data on the prevalence of complications also.

Classic symptoms of hyperglycemia, polyurea, polydipsia and weight loss are often absent in people with type 2 diabetes.

However those with newly diagnosed diabetes are more likely to report symptoms related to cardiovascular system, neurology etc.[2]

In fact various studies report that nearly 50% of newly diagnosed patients have presence of one or more complications at the time of diagnosis. It seems reasonable to assume that diabetes has a recognizable preclinical stage. The duration of the preclinical stage has been estimated by extrapolation from the prevalence of complications at clinical diagnosis[3].

The complications of diabetes affect many organ systems and are responsible for the majority of morbidity and mortality associated with disease.

Complications of diabetes can be divided into vascular and non vascular. Vascular complications can be further divided into microvascular and macrovascular.

Microvascular

Retinopathy

Nephropathy

Neuropathy

Macrovascular

Coronary heart disease

Cerebrovascular disease

Peripheral vascular disease

In addition to the said complications of diabetes, there is a strong association between diabetes and obesity, hypertension and dyslipidemia.

In population studies the prevalence of hypertension in Type 2 diabetes is more common than in non diabetic individuals. In fact hypertension is a common, important and modifiable risk factor for both micro and macro vascular complications of diabetes. Hypertension is clearly associated with insulin resistance.

Dyslipidemia tends to clearly show an association with Type 2 diabetes. The hallmarks of diabetes dyslipidemia are elevated TG, low HDLand a small, dense more atherogenic LDL[4]. Dyslipidemia often preceeds the onset of Type 2 diabetes and may persist despite a blood sugar control.

The association between obesity and Type 2 diabetes is well known. The escalating epidemic of Type 2 diabetes that we are experiencing is largely attributable to the fattening of modern society. Obesity increases the risk of developing diabetes and complicates its treatment [5,6,7] . Obese individuals with diabetes also have higher mortality rates than thinner individuals.

Thus, in addition to various complications the prevalence of obesity, hypertension and dyslipidemia may be high at the time of diagnosis of Type 2 diabetes.

As mentioned earlier various studies have reported the prevalence of different types of complications at the time of diagnosis to be 20 – 50%.

Since no such study has been conducted in Bundelkhand region we decided to undertake this study to study the prevalence of complications in newly diagnosed Type 2 diabetes mellitus patients.

Review Of Literature

Review of literature

Population based studies designed to estimate the prevalence of diabetes have generally found that one third to one half of all diabetes is undiagnosed. The duration of this preclinical stage has been estimated by extrapolation from the prevalence of complications at the time of clinical diagnosis.

Various studies have been done that show that the prevalence of complications in newly diagnosed patients are anything between 10-50%.

One of the largest studies conducted in diabetes- the United Kingdom Prospective Diabetes Study (UKPDS) showed that nearly 50% of newly diagnosed type 2 subjects already had signs of diabetic tissue damage.

39% had hypertension
31% had microaneurysms
18% had retinopathy
18% had microalbuaurnuria
13% had absent ankle reflexes

Apart from this major study various other studies have also shown the prevalence of complications at the time of diagnosis.

Brookmeyer et al[3] in 1986 demonstrated the prevalence of complications in newly diagnosed patients as 2-39% had retinopathy, 8-16% had nephropathy, 5-12% had neuropathy & about 8% had cardiovascular disease.

Fernando et al[10] studied the complications in 597 newly diagnosed patients in 1998 in Sri Lanka & showed the following results- nephropathy was present in 29% of patients, neuropathy in 25%, coronary artery disease in 21%, retinopathy in 15%, hypertension in 23%, stroke in 5.6%, peripheral vascular disease in 9.8%, obesity in 16%, hypercholesteremia in 11% & hypertriglyceridemia in 14%.

Tzeng et al[11] in 2001 showed in a study in Taiwan that 25% of newly diagnosed subjects of type 2 diabetes had retinopathy, 18% had nephropathy & 22% had hypertension.

A study carried out in the Dept. of Medicine, Central Middle Sex Hospital in London in 2001 revealed that the prevalence of complications were common in newly diagnosed type 2 patients with a quarter of all patients having evidence of at least one complication. The prevalence of microvascular disease was 27% and that of macrovascular disease was 15%. Prevalence of retinopathy was 17.5% while the prevalence of nephropathy was 18.1% at the time of diagnosis.

Shin et al[12] in 2001 studied 148 newly diagnosed patients and concluded that 18.2% patients had nephropathy as assessed by urine albumin excretion rate, 25.5% had retinopathy assessed by fundoscopy & flourescent angiography. Blood pressure was found to be higher in patients with overt proteinuria.

Chowdhary et al[13] in 2002 studied 292 patients with newly diagnosed type 2 diabetes who were less than 40 years of age. Results showed a prevalence of 15.7% of macrovascular disease and 27.3% for microvascular disease. Retinopathy was found in 17.5% patients while nephropathy was found in 18.1% patients. These complications were found to be higher in South Asians in comparison to Europeans.

Krahulec B et al[14] in Nov 2002 studied 3424 newly diagnosed patients. Their results showed that hypercholesterimia was present in 67% patients, hypertriglyceridemia in 66.5% patients. Hypertension was seen in 67.9% patients, Microalbuminuria was seen in 20.5% patients while 22.8% had IHD.

Spijkerman et al[15] in Sep 2003 studied newly diagnosed patients and found that prevalence of retinopathy was 1.9%, impaired foot sensitivity was 48%, microalbuminuria was 17.2%.

The hypertension in diabetes study HDS-1 conducted in 1993[16] concluded that 39% of newly diagnosed type 2 patients had hypertension. These patients had a great mean body mass index

(BMI) than normotensive patients. Such patients also showed a higher prevalence of cardiovascular events and also of microalbuminuria.

Pyrola et al[17] reported the prevalence of hypertension to be increased by 1.6 fold in newly diagnosed patients. The prevalence of coronary artery disease was found to be increased by 1.7 fold in males and 4.4 fold in females as compared with non diabetic subjects. Prevalence of proteinuria was 19.5%.

Nambuya et al[18] in 1996 studied 252 patients in Uganda and found the peripheral neuropathy was present in 46% of patients, hypertension in 27.3%, impotence in 22%, proteinuria in 17%, ischemic heart disease in 4.8%, foot ulcers in 4.0% and cataract in 3% patients.

Ruigomez A et al[19] studied 1077 newly diagnosed patients and found that 360 patients (33.4%) already had one or more of the various complications.

Anderson AH et al[20] studied 1251 newly diagnosed patients and found the prevalence of retinopathy to be 5%. An intriguing finding was an inverse relationship between fasting triglycerides & retinopathy.

Talu S et al[21] studied 487 newly diagnosed patients and found 70 of them (14.3%) to be having retinopathy. Among these back

ground retinopathy was the leading manifestation followed by macular edema, proliferative retinopathy & pre proliferative retinopathy.

Ratzmann et al[22] in 1991 studied 95 newly diagnosed patients and found 6.3% of patients to be having peripheral neuropathy while 2.1-7.3% patients had cardiovascular autonomic neuropathy.

Klein R et al[23] showed the prevalence of retinopathy to be 10.2% in a recent cross sectional study. They concluded that this is likely to be due to a long history of undiagnosed diabetes during which retinopathy develops.

Ballard et al[24] showed that nephropathy is often present early in the course of disease with upto 8% of newly diagnosed patients having proteinuria.

Migdalis & co-workers[25] found that the prevalence of peripheral vascular disease in newly diagnosed type 2 patients is 6.6%. They also found that patients with PVD had low HDL-C levels & high triglyceride levels.

Liu D P et al[26] studied 773 newly diagnosed patients and found that nearly 21% already had retinopathy at the time of diagnosis.

McDowell and co-workers[27] found that diabetic foot was present in nearly 20% of newly diagnosed patients and they had to undergo lower extremity amputation within one year of diagnosis.

Joglekar & co-workers[28] studied the lipid profile in newly diagnosed type 2 patients with regard to levels of cholestrol, triglyceride and non esterified falty acid (NEFA). They concluded that triglyceride and NEFA were raised significantly in newly diagnosed patients while cholestrol was not in comparison to controls.

McDaid et al[29] studied 41 newly diagnosed patients and found that peripheral autonomic nephropathy was present in significant number of patients.

Talu et al[30] studied retinopathy in newly diagnosed patients and found 11.7% patients had background retinopathy, 1.4% had clinically significant vascular edema & 1.02% had proliferative retinopathy.

Unuigbe et al[31] studied 66 newly diagnosed patients and found microalbuminuria in 50% of them. They also found retinopathy in 23% of patients.

Frost D et al[32] studied intimal medial thickness (IMT) in carotid arteries and found that subclinical atherosclerosis was present in sizeable number of patients.

Kumar Rakesh[33] et al studied the prevalence of complications in newly detected patients and reported 47.3% patients having neuropathy, 34.4% had microalbuminuria, 28% having retinopathy, 14% had coronary artery disease & 11% had peripheral vascular disease.

McKuige et al[34] in a study in England showed that truncal skinfold thickness in south asian men were significantly greater despite similar skinfold thickness on the limbs at a comparable BMI.

Banerji et al[35] while studying obesity in migrant Indians in USA found that the exaggerated risk of insulin resistance in Indians is very likely due to an excess total body fat in comparision to caucasions.

Patel et al[36] studied infections in diabetes and found that skin and soft tissue infections may be the first manifestation of the disease.

Howard et al[37] in the strong heart study found that dyslipidemia in women tends to be more severe than in men.

Aims

&

Objectives

Aims and objectives

To study the prevalence of microvascular, macrovascular, nonvascular complications and associated risk factors such as hypertension, dyslipidemia and obesity in newly diagnosed type 2 diabetes patients.

Material & Methods

Material and Methods

The present study was conducted on subjects attending the diabetes clinic in the Department of Medicine, as well as the General Medicine OPD and on the patients admitted in the wards.

Criteria for selection

Any individual who was diagnosed to be having type 2 diabetes mellitus for the first time (within 3 months of diagnosis) was included in the study. The criteria for diagnosing diabetes were the same as laid down by WHO.

Symptoms of diabetes plus RBS ≥ 200 mg%

Or

Fasting plasma glucose ≥ 126 mg%

Or

2 hours plasma glucose ≥ 126mg% during an oral glucose tolerance test.

Clinical evaluation of the patients

A detailed history with regard to age, sex and symptoms of the patients was taken. A physical examination to assess the general condition of the patient was carried out.

To detect complications and risk factors the following methods were adopted:

Hypertension : A blood pressure recording of more than 140 / 90 mm of Hg in a relaxed comfortable position of the patient was taken as hypertension.

Dyslipidemia : A complete fasting lipid profile was carried out at our lipid lab. Normal values of various lipids were taken as

Serum Triglyceride < 150 mg%.
LDL-C < 100 mg%.
HDL-C > 40 mg% in males and > 50 mg% in females.
Serum cholesterol < 200 mg%.

Retinopathy : A thorough fundus examination was undertaken to look for retinal vascular microaneurysms, blot hemorrhages and cotton wool spots (non – proliferative diabetic retinopathy), and appearance of neovascularization (proliferative diabetic retinopathy).

Nephropathy : Urine examination including 24 hours urinary protein excretion along with BUN and serum creatinine was carried out.

Neuropathy : A complete motor and sensory examination was carried out to detect any polyneuropathy, radiculopathy or mononeuropathy.

Cardiovascular disease : For assessment of cardiovascular disease, a resting ECG, echocardiography and if required TMT was undertaken.

Cerebrovascular disease : A detailsed history was taken to rule out episodes of stroke and if required carotid IMT was done.

Peripheral vascular disease : Ankle-brachial blood pressure index was calculated with 0.9 being taken as normal value.

Other complications were diagnosed on clinical grounds.

Working Proforma

Case No. MRD/OPD No. Date.

Name

Address

Age/Sex Occupation

Socio economic status

Chief complaints

Family history

Personal history – Veg/Non-veg

Smoker/ Non Smoker

Tobacco chewer/ Non Tobacco chewer

Alcoholic/ Non-Alcoholic

Gen Examination Pulse

Blood Pressure – Standing

Supine

Anthropometry Weight

Height

BMI

Abdominal Circumference

Systemic Examination

CNS- Motor System

Sensory system

Cranial nerves

Autonomic nervous system

CVS

Respiratory system

Abdomen

Fundus examination

Foot examination

Ankle brachial pressure index

Investigations

Blood sugar

ECG

Echo

24 Hour urinary protein

BUN

Serum Creatinine

Fasting lipid profile- S. Triglyceride

LDL cholestrol

HDL cholestrol

Total cholestrol

VLDL

Carotid IMT

Chest x-ray

Observations

Observations

I Table showing distribution of patients according to sex

	No	%
Males	59	65.5
Females	31	34.5

II Table showing distribution of patients according to their age at the time of presentation

	No	%
25-29	3	3.3
30-39	17	18.8
40-49	18	20
50-59	35	38
60-70	17	18.8

III Table showing distribution of patients according to their socio economic status

	No	%
Lower	24	26.5
Middle	61	67.9
Upper	5	5.5

IV Table showing the complaints at the time of presentation

	No	%
Classical(Polyurea, Polydipsia Weight loss)	30	33.3
Pain in lower limbs (exclusively)	4	4.4
Tingling in the limbs (exclusively)	11	12.2
Infections	10	11.1
Combination of classical, pain or tingling	26	28.8
None-detected routinely	9	10

V Table showing presence of family hisrtory in patients

	No.	%
Both parents	3	3.3
Father only	8	8.8
Mother only	2	2.2
Siblings	2	2.2

VI Table showing distribution of patients according to BMI

	No	%
<18.5	10	11.1
18.5- 24.9	53	58.8
25.0-29.9	23	25.5
≥30	4	4.4

VII Table showing distribution of patients according to their blood pressure as per JNC VII

	No	%
Normal	44	48.8
Prehypertension	6	6.6
Stage I hypertension	18	20
Stage II hypertension	22	24.4

VIII Table showing distribution of patients according to their LDL cholestrol levels (in mg%)

	No	%
<100	22	24.4
100-129	42	46.6
130-159	20	22.2
160-189	6	6.6
>190	0	0

IX Table showing distribution of patients according to their triglyceride levels (in mg%)

	No	%
<150	20	22.2
150-199	31	34.4
200-499	38	42.2
>500	1	1.1

X Table showing distribution of patients according to their HDL cholestrol levels (in mg%) in females

	No	%
<50	26	83
>50	5	17

XI Table showing distribution of patients according to their HDL cholestrol levels (in mg%) in males

	No	%
<40	19	32
>40	40	68

XII Table showing distribution of patients according to their 24 hour urinary protein excretion

	No	%
<150 mg	83	92
>150 mg	7	8

XIII Table showing distribution of patients according to retinopathy

	No	%
Normal fundus	75	83.3
Macular edema	4	4.4
Exudates, Hemorrhages, Cotton wool spots (preproliferative changes)	11	12.2
Proliferative changes	0	0

XIV Table showing distribution of patients according to their ECG changes

	No	%
Normal ECG	80	88.8
Ischemic changes	6	6.6
Infarction	2	2.2
LVH	2	2.2

XV Table showing distribution of patients according to Neuropathy

	No	%
Any feature of neuropathy	42	46.6
Tingling in the limbs	25	27.7
Pain in the lower limbs	10	11.1
Pain plus tingling	7	7.7
Loss of ankle reflexes	17	18.8

XVI Table showing distribution of patients according to presence of infections

	No	%
Skin & soft tissue infections	11	12.2
Pulmonary tuberculosis	5	5.5
Others	1	1.1

TABLE IV. SHOWING THE COMPLAINTS AT TIME OF PRESENTATION.

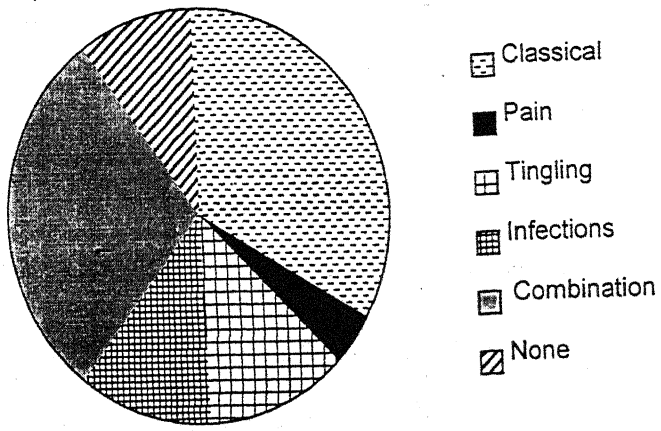


TABLE VI. SHOWING DIS1TRIBUTION OF PATIENTS ACCORDING TO BMI.

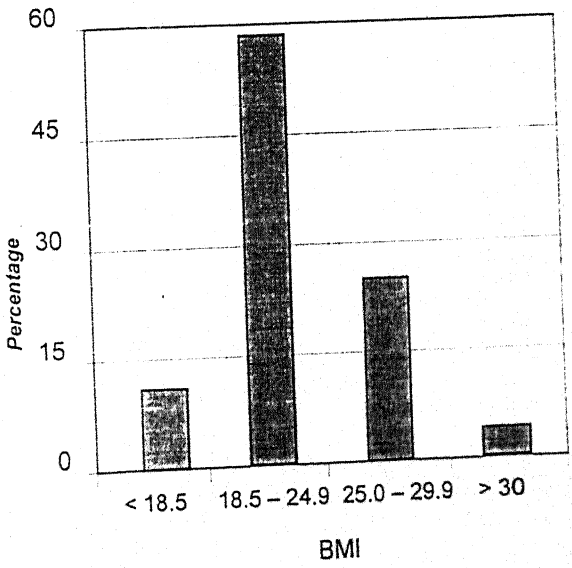


TABLE VII. SHOWING DISTRIBUTION OF PATIENTS ACCORDING TO THEIR BLOOD PRESSURE AS PER JNC VII.

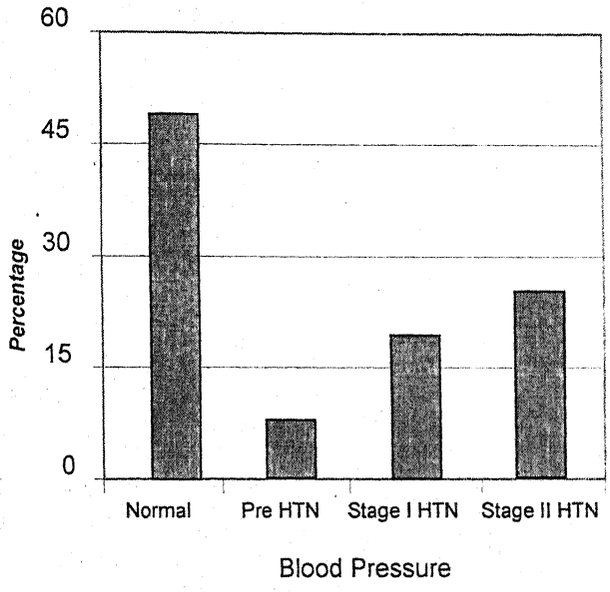


TABLE IX. SHOWING DISTRIBUTION OF PATIENTS ACCORDING TO THEIR TRIGLYCERIDE LEVELS IN MG%.

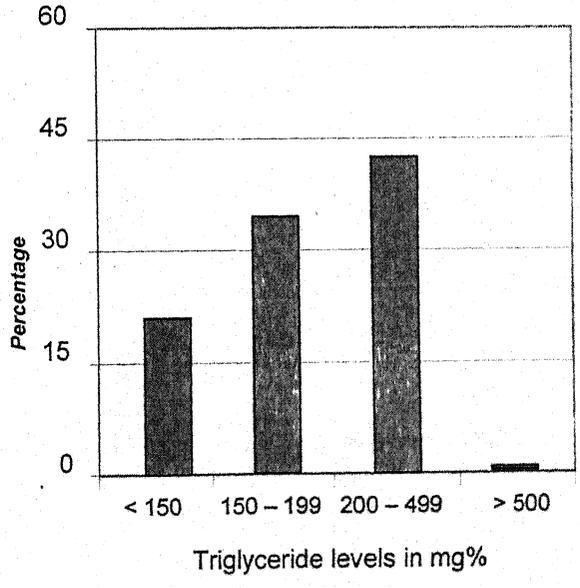


TABLE XIII. SHOWING DISTRIBUTION OF PATIENTS ACCORDING TO THEIR FUNDUS CHANGES.

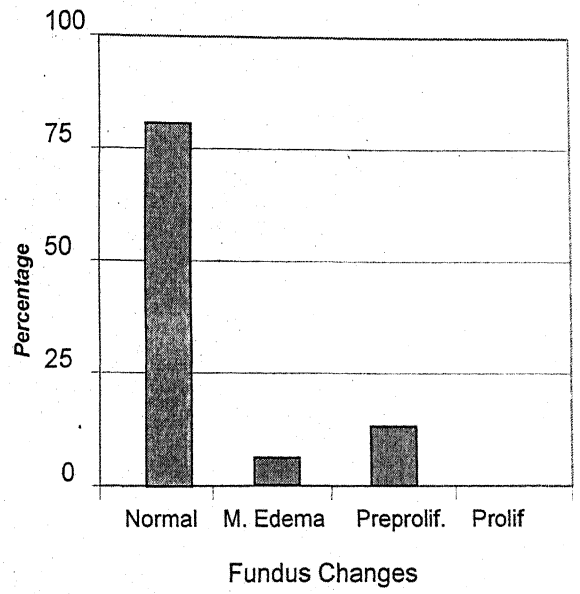
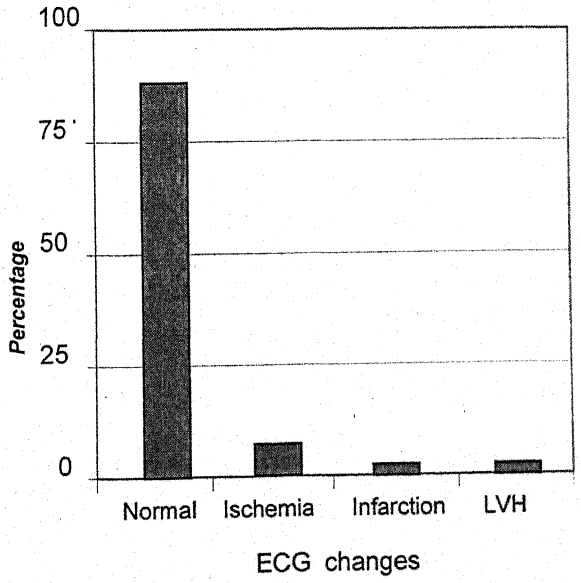


TABLE XIV. SHOWING DISTRIBUTION OF PATIENTS ACCORDING TO THEIR ECG CHANGES.



Discussion

Discussion

The present study was conducted in the department of Medicine,MLB Medical college Jhansi. The subjects were taken from the Diabetes OPD, Medicine OPD and those who were admitted to wards. The study included 90 patients with type 2 diabetes detected within 3 months. The study was conducted from Sep 2002 to Dec 2003.

Of the 90 patients studied 59 were males and 31 were females (table I). Maximum number of patients (38%) were in the 50-60 years age group followed by 20% in the 40-50 group (table II), 3 patients were less than 30 years of age and type 1 diabetes in them was excluded on the basis of absence of history and present status of ketoacidosis.

67% of the patients in the present study belonged to the middle socioeconomic group and along with the upper class constituted nearly 72% of patients (table III).This finding seems to be consistent with the fact that diabetes prevalence is increasing because of obesity and reduced physical activity.

If we consider the symptoms at the time of diagnosis, nearly 60% patients presented with the classical symptoms of polyurea, polydipsia and weight loss(table IV). This compares with United

Kingdom Prospective Diabetes Study (UKPDS),where nearly 60-65% patients presented with classical symptoms. Nearly 46% patients had features of neuropathy in the form of tingling in the limbs or pain in the lower limbs alone or in combination with classical symptoms. This is in contrast to the UKPDS finding of only 20-25% patients who presented with symptoms of paraesthesia. But our findings are similar to that of Singh et al who report a prevalence of 47% of neuropathy in newly diagnosed patients.

Nearly 10% patients were detected routinely most commonly when being posted for surgery. This finding is somewhat similar to that observed in the third National Health and Nutrition Examination Survey(NHANES),where 6-7% of patients were found to be diabetic on routine detection.

Infections particularly those of skin and soft tissues are common in diabetes and can be the first manifestation of the disease as shown by Patel et al in Papua New Guinea. In our study nearly 11% patients presented with infections mainly those of skin.

A family history of diabetes was found in only 16% of patients.(Table V)

If we consider the Body Mass Index (BMI) of the population studied, nearly 58% of patients are in the normal BMI range of 18.5-24.9(TABLE VI). 30% of patients had a BMI of more than 25.0. These findings are consistent with the observation of various

workers notably McKeiuge et al in England and Banerji et al , that Indians are at an exaggerated risk of insulin resistance and diabetes at a relatively lower BMI, probably due to an excess total body fat composition and by the fact that they are centrally obese as judged by their abdominal circumference. Fernando et al found obesity in 16% of patients. Nearly 11% patients had a BMI of less than 18.5 and belonged to the group of LB type 2 diabetes.

Table VII shows that nearly 44% of the subjects had hypertension at the time of diagnosis. UKPDS has reported a prevalence of 39% in newly diagnosed patients. Fernando et al found hypertension in 23% while Krahulec B et al found it in 66% of patients. Hypertension is clearly associated with insulin resistance although the strength and nature of association remain unclear.

When we consider the lipid profile of the study group, nearly 46% of the patients had LDL-C in the range of 100-130 mg%(table VIII). According to the national Cholestrol Education Program ATP 3 report, this group requires therapeutic lifestyle changes.

Nearly 29% of patients had their LDL-C levels above 130 mg% which calls for initiation of drug therapy. Only 24% of the patients had their LDL-C levels below the goal of 100 mg%.

When we consider the triglyceride (TG) levels nearly 34% patients had their triglyceride levels in the range of 150-200 mg% calling for therapeutic lifestyle changes and nearly 43% patients

had their TG levels more than 200 mg% which requires initiation of drug therapy. This finding seems to be consistent with the fact that diabetes causes raised triglyceride levels. Krahulec B et al found hypertriglyceridemia in 66% patients.

When we consider the HDL-C levels 32% males had their levels less than 40 mg% while 83% of females had their HDL-C levels less 50 mg%.These findings tend to suggest that HDL-C levels are more prevalent in females than males. Howard et al in the Strong Heart study found that dyslipidemia in women tends to be more severe than in men.

Table XII shows the 24 hour urinary protein excretion. Nearly 8% patients had a protein excretion of more than 150 mg in 24 hours. Ballard et al in their group of patients also found 8% proteinuria. Brookmeyer et al found the prevalence of nephropathy to be 8-18%.

Table XIII shows that nearly 83% of patients had normal fundus on examination. 4% patients had evidence of macular edema while preproliferative changes in the form of exudates, hemorrhages and cotton wool spots in various combinations were found in nearly 12% of patients. None of the patients was found to have proliferative changes.These findings are very similar to those of UKPDS which reported 18% patients having retinopathy at the time of diagnosis. Fernando et al in their study also found

retinopathy in 15% patients, Choudhary et al found retinopathy in 17% while Talu et al in 11.7% of patients.

When we consider the ECG changes in the study group (tableXIV), 88% patients had normal ECG . 6% had evidence of ischemia while 2% had evidence of infarction. Another 2% patients had left ventricular hypertrophy. The 8% prevalence of CAD compares with the 14% prevalence found by Singh et al and 5% found by Nambuya et al.

Table XV shows features of neuropathy either in the form of symptoms or clinical examination. 27% patients had complaints of tingling in the lower limbs,11% had pain in both lower limbs while another 7% had a combination of the two.18% patients had loss of ankle reflexes on examination. UKPDS had 13% patients presenting with loss of ankle reflexes.

When we consider infections, nearly s12% of our patients had skin and soft tissue infections while 5% had evidence of pulmonary tuberculosis table XVI) .Skin and soft tissue infections are particularly common in diabetics probably due to defects in immune system.

It is generally accepted that pulmonary TB is more prevalent in diabetics than in non diabetics. Various workers have reported the prevalence of pulmonary TB in diabetics to vary from 0.5% to 15%.But more studies need to be done to establish whether the

prevalence of TB in diabetics is more than in non diabetic population.

Conclusion

Conclusions

Conclusions that can be drawn from the present study are

1. Complications are often present at the time of diagnosis of type 2 diabetes mellitus. This implies that there is definite preclinical stage of a variable period when the disease remains undetected.
2. In our study the most prevalent complication was neuropathy (47%)
3. 77% patients had hypertriglycidemia. 32% males had low HDL-C levels while 83% of females had low HDL-C levels.
4. 30% patients were overweight / obese.
5. 33% patients presented with classical symptoms while 16% had features attributable to neuropathy. 28% patients had a combination of the two.
6. 44% patients had hypertension.
7. 16% had evidence of retinopathy.
8. 8% patients had coronary artery disease.
9. 8% patients were found to have proteinuria.
10. 17% patients presented with infections.

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Master Chart

S.No.	Name	Sex	Age	Bld. Sugar	S.E. Status	Complaints	FH	Wt	Ht	BMI	Ab C	BP	HDL	LDL	TG	Ch	VLDL	24 hr U P	Fundus	ECG	Neuro-pathy
1	Arija	F	50	F 180	M	Cl	Neg	65	150	29	105	150 / 100	48	155	187	240	37	60	P	N	P
2	Bharat Bhusan	M	32	F 318	M	Cl	Neg	43	173	14	67	110 / 60	42	66	135	130	27	100	N	N	P
3	Laxman Singh	M	65	R 301	L	Cl	Neg	67	172	22	95	114 / 76	36	109	107	166	21	100	P	N	P
4	Bhagwati	F	67	R 360	L	Par	Neg	65	150	29	105	120 / 60	38	106	133	171	27	30	N	LVH	P
5	Kamla Malik	F	53	F 170	M	Par	Neg	54	162	20	70	150 / 100	48	126	213	220	43	20	N	N	P
6	Agun Ram	M	40	R 594	M	Cl	F	67	175	23	61	130 / 80	32	96	160	160	32	20	N	N	A
7	Anil	M	36	R 214	M	Inf	F	65	160	25	80	116 / 70	48	169	166	250	33	Nil	N	N	A
8	Leelawati	F	25	F 131	M	Par	Neg	40	145	19	64	120 / 80	38	106	185	150	33	60	N	N	P
9	Sheela	F	35	F 133	M	None	Neg	50	152	21	80	140 / 90	45	133	160	210	32	20	N	N	A
10	Asharfi Lal	M	50	R 213	L	Par	Neg	83	170	28	106	124 / 80	48	124	229	217	45	30	N	N	P
11	P.C. Gupta	M	65	F 231	H	Inf	Neg	64	164	24	93	130 / 90	48	100	233	195	47	20	N	N	A
12	Mohan Sahu	M	30	R 600	M	Cl	Neg	60	165	22	80	110 / 70	42	102	160	170	32	100	P	N	A
13	Meera Mathur	F	52	R 215	H	Par	M	60	158	24	80	140 / 90	42	106	138	177	38	Nil	N	N	P
14	Basheer Ahmad	M	60	R 229	L	Par	Neg	67	180	20	92	110 / 70	48	102	138	177	38	30	P	N	P
15	Bhagat Singh	M	47	R 240	L	Cl	Neg	75	177	23	89	110 / 70	42	96	130	150	34	Nil	P	N	A
16	Panna Lal	M	54	R 325	M	Pain	Neg	70	161	27	102	140 / 90	50	147	160	229	32	Nil	P	N	P
17	Kallu Kushwaha	M	50	F 180	L	Inf	Neg	60	168	22	80	110 / 70	45	99	167	187	33	100	N	N	A
18	Munni Devi	F	50	R 470	M	Cl	Neg	60	158	24	85	146 / 100	55	122	280	233	56	640	P	N	A
19	Mohan Agarwal	M	50	F 261	M	Cl	F	96	170	33	117	160 / 100	45	111	220	200	44	160	N	N	A
20	Kiran	F	41	R 267	M	Cl	Neg	90	165	35	92	160 / 100	45	121	208	217	41	60	N	N	A
21	Parveen	M	33	R 290	M	Inf	Neg	60	170	20	88	120 / 80	52	140	206	233	41	350	N	N	A
22	Sita Ram	M	55	R 474	M	Pain	Neg	60	160	23	87	130 / 90	48	102	240	200	48	100	N	N	P
23	Komal Singh	M	30	F 7600	M	Cl	Neg	60	170	20	88	110 / 70	36	100	173	170	34	20	N	N	A
24	Ashvini Kumar	M	37	F 235	M	Cl	Neg	49	158	19	80	120 / 80	42	132	190	212	37	30	P	N	P
25	S.S. Tomar	M	70	R 245	M	Laf	Neg	76	170	26	109	160 / 100	40	116	70	170	37	130	N	N	P

S.No.	Name	Sex	Age	Bld. Sugar	S.E. Status	Complaints	FH	Wt	Ht	BMI	Ab C	BP	HDL	LDL	TG	Ch	VLDL	24 hr U P	Fundus	ECG	Neuro-pathy
26	R.K. Gupta	M	65	R 7600	H	CVA	Neg	60	168	22	80	160 / 100	45	109	167	187	33	400	N	Ab	P
27	Radhey Shyam	M	49	R 7403	M	Cl	Neg	61	168	20	85	150 / 100	40	115	342	190	34	80	N	N	A
28	Sita Ram	M	60	R 229	M	Inf	Neg	55	164	20	93	116 / 90	48	102	240	200	36	Nil	N	N	A
29	Mukesh Chabda	M	52	R 229	M	None	Neg	73	170	25	92	120 / 90	43	139	187	219	37	Nil	N	N	A
30	Ram Babu	M	30	R 250	M	Cl	Neg	60	165	22	80	120 / 60	45	113	213	200	42	100	N	N	A
31	Baboo Lal	M	50	R 216	L	Pare	Neg	83	170	28	106	124 / 80	48	124	229	217	45	30	P	N	P
32	Shiv Kumar	M	47	R 240	L	Cl	Neg	75	177	23	89	110 / 70	42	96	130	150	34	Nil	N	N	A
33	Parvati	F	41	R 250	M	Cl	Neg	90	165	35	92	160 / 100	45	111	220	200	44	160	N	N	A
34	Ramashankar	M	70	R 280	M	Inf	Neg	76	170	26	109	160 / 100	40	116	70	170	41	130	N	LVH	P
35	Nisar	M	30	R 250	M	Cl	Neg	60	165	22	80	120 / 80	47	110	215	200	40	80	N	N	A
36	Devki	F	53	F 170	M	Pare	Neg	54	160	20	70	150 / 100	48	120	215	220	40	Nil	N	Ab	P
37	Savitri Devi	F	50	F 180	M	Cl	Neg	65	150	29	105	150 / 100	45	150	180	240	37	60	N	N	P
38	Sita Ram	M	40	R 480	M	Inf	Neg	67	175	23	61	120 / 80	35	94	150	150	42	20	N	N	A
39	Ramesh Prasad	M	65	F 220	H	Pain	Neg	64	164	24	93	130 / 90	35	100	210	180	42	20	N	Ab	A
40	Pramod	M	54	R 300	H	Cl	Neg	70	161	27	102	140 / 70	50	147	160	230	36	Nil	P	N	P
41	Rupa Devi	F	30	F 411	M	Cl	Neg	45	145	21	70	110 / 70	48	116	233	210	46	Nil	N	N	A
42	Somwati	F	55	R 369	L	None	Neg	34	160	13	60	140 / 100	45	115	227	205	45	Nil	N	A	P
43	Kishori Devi	F	71	R 295	M	Cl, Pain	Both	45	154	19	70	160 / 100	45	126	213	213	42	20	N	Ab	A
44	Gaura Bai	F	50	R 300	L	Cl, Pain	Neg	64	153	27	80	140 / 90	50	92	400	222	30	50	N	N	P
45	Nasir	M	35	R 328	M	Cl, Pain	M,S	70	171	24	87	120 / 80	50	142	206	233	41	Nil	N	N	P
46	Rajeev	M	27	R 229	M	Balonopos	Neg	66	167	24	89	124 / 80	48	150	166	231	33	Nil	N	N	P
47	Shiv Kumar	M	37	R 247	M	Cl	Neg	55	160	21	86	120 / 76	50	226	225	225	42	Nil	N	N	A
48	Rajesh	M	42	R 201	M	Cl	Neg	70	157	28	94	120 / 80	34	132	115	199	37	Nil	N	N	A
49	Lalita Devi	F	46	F 173	M	Inf	Neg	50	149	23	70	110 / 70	48	153	154	137	33	Nil	N	N	P
50	Veena Bajpai	F	48	R 318	M	Cl	Neg	54	152	23	83	186 / 90	56	151	210	250	34	Nil	P	N	A

S.No.	Name	Sex	Age	Bld. Sugar	S.E. Status	Complaints	FH	Wt	Ht	BMI	Ab C	BP	HDL	LDL	TG	Ch	VLDL	24 hr U P	Fundus	ECG	Neuro-pathy
51	Vimal	M	33	R 290	M	Inf	Neg	60	170	20	85	120 / 80	52	140	210	240	41	300	N	N	A
52	Channa Ram	M	65	R 7600	M	CVA	Neg	60	168	22	80	160 / 100	45	110	170	190	33	500	N	Ab	A
53	Dhani Ram	M	50	R 215	L	Parc	Neg	83	170	28	106	124 / 80	40	124	230	220	45	30	N	N	P
54	Girja Devi	F	53	F 170	M	Parc	Neg	54	160	20	70	150 / 100	45	130	220	210	40	40	N	N	P
55	Jagdish	M	32	F 318	M	Cl, Pain	Neg	54	170	14	68	110 / 60	40	70	130	130	30	100	N	N	P
56	Bhaiya Lal	M	65	R 301	L	Cl, Pain	Neg	67	172	22	95	114 / 76	38	110	110	160	21	100	P	N	P
57	Dhyanwati	F	67	R 360	L	Pain	Neg	65	150	29	105	120 / 60	36	105	130	170	27	30	N	Ab	P
58	Anil	M	36	R 214	M	Inf	F	65	160	25	80	116 / 70	46	170	170	250	33	Nil	N	N	A
59	Kiran	F	25	F 131	M	Pain	Neg	40	145	19	64	120 / 80	40	106	185	150	33	60	N	N	P
60	Usha	F	35	F 140	M	None	Neg	50	152	21	80	140 / 90	48	130	170	210	32	20	N	N	A
61	Mahesh	M	40	R 208	M	Cl, Pain	Neg	70	162	26	95	120 / 80	48	96	160	160	32	20	N	N	P
62	Julekha	F	52	F 130	L	Cl	Neg	55	157	22	85	110 / 70	48	150	185	240	37	Nil	N	N	A
63	Shankar Lal	M	50	R 220	M	Cl	F	59	161	21	84	150 / 100	50	147	160	229	30	Nil	N	N	A
64	Bhadai	M	55	R 201	L	Cl, Pain	Neg	35	163	13	61	130 / 80	50	96	130	150	34	Nil	N	N	P
65	Kastoori Devi	F	50	R 7600	M	Cl	Neg	37	153	16	62	120 / 70	38	105	130	170	41	Nil	N	N	A
66	Prabhu Dayal	M	52	R 230	M	Pain	Neg	63	165	23	88	140 / 96	48	100	233	195	34	Nil	N	N	P
67	Pradeep Kumar	M	27	R 228	M	None	S	71	168	25	90	104 / 80	40	75	333	183	66	50	N	N	A
68	Ram Babu	M	52	R 238	M	Cl, Pain	Neg	56	157	23	86	120 / 80	48	96	160	170	32	20	P	N	P
69	Rajesh Soni	M	40	R 416	M	Cl, Pain	Neg	45	154	19	70	120 / 80	45	96	150	150	37	20	N	N	P
70	Jassi	M	55	F 157	L	Cl	Both	37	158	15	60	114 / 80	48	100	233	195	41	Nil	N	N	A
71	Baini Bai	F	70	R 414	L	Chest pain	Neg	45	154	19	70	110 / 70	45	102	210	189	42	30	N	Ab	A
72	Prakash Narayan	M	50	R 360	M	Cl	Neg	61	168	20	85	150 / 100	40	115	342	190	36	20	N	N	A
73	Lalita Devi	F	46	R 173	M	Cl, Pain	Neg	50	149	23	84	130 / 80	40	96	154	137	37	Nil	N	N	P
74	Prabhu nath	M	49	F 156	M	Chest pain	Neg	56	160	22	87	110 / 80	38	111	181	185	36	Nil	N	Ab	A
75	Madeena	F	50	F 239	L	Cl	Neg	67	154	28	95	140 / 90	45	125	200	210	40	Nil	N	N	A

S.No.	Name	Sex	Age	Bld. Sugar		S.E. Status	Complaints	FH	Wt	Ht	BMI	Ab C	BP		HDL	LDL	TG	Ch	VLDL	24 hr U P	Fundus	ECG	Neuro-pathy
76	Radha Rani	F	40	R	266	L	Cl, Injury	Neg	39	151	19	110	110 /	80	12	114	506	212	101	Nil	N	N	P
77	Sundar Lal	M	50	F	261	L	Weakness	Neg	40	165	15	90	90 /	60	60	75	160	160	20	Nil	N	N	A
78	Sangeeta	F	31	R	307	M	Cl, Pain	Neg	31	154	13	50	110 /	70	55	159	213	257	34	Nil	N	N	A
79	Om Prakash	M	53	R	280	M	Cl, Pain	Neg	75	164	28	107	150 /	90	40	98	200	178	36	20	N	N	A
80	Lala Ram	M	55	R	265	L	Cl, Pain	Neg	41	170	14	80	90 /	60	40	110	230	210	27	Nil	N	N	A
81	Suresh	M	49	R	380	M	Cl	F	52	156	21	116	80 /	60	60	80	115	150	25	Nil	N	N	A
82	P.C. Pillai	M	49	R	297	M	Cl	Neg	78	167	28	95	160 /	100	48	124	229	217	45	40	P	N	A
83	Siya Devi	F	46	R	335	L	None	Neg	61	154	26	91	150 /	90	45	111	220	200	44	Nil	N	N	A
84	Manni Lal	M	50	F	261	L	Cl	F	96	170	33	117	160 /	100	40	111	220	200	34	160	N	Ab	A
85	Ram Kali	F	50	R	470	M	Cl	Neg	50	149	23	84	146 /	100	55	120	280	233	40	Nil	N	N	A
86	Dhani Ram	M	50	F	180	M	Cough	Both	52	156	21	110	110 /	70	45	99	187	100	37	Nil	N	N	A
87	Rama Shankar	M	54	R	323	M	Pain	Neg	70	161	27	102	140 /	90	50	147	147	160	36	Nil	P	N	P
88	Shiv Kumar	M	47	R	220	M	Cl	Neg	75	177	24	89	110 /	70	40	95	130	150	41	Nil	N	N	A
89	Baboo Lal	M	60	R	229	L	Pain	F	67	180	21	92	110 /	70	48	102	240	200	36	30	N	N	P
90	Dhyanwati	F	52	F	180	L	Pain	Neg	60	158	24	85	140 /	90	45	95	138	177	33	Nil	N	N	P

Cl - Classical, Par - Paresthesia, Inf - Infection, L - Low, M - Middle, H - High
N - Normal, Ab - Abnormal, P - Present, A - Absent